

Massachusetts Bays National Estuary Program
Implementation Workplan
July 1, 2016 to June 30, 2017

Critical Areas and Outcomes

MassBays' workplan for FFY2016 augments and expands ongoing efforts to mitigate and halt chronic impacts on the region's estuarine habitats posed by the following Critical Impact Areas:

- Contaminated and uncontrolled stormwater runoff (SW)
- Wastewater discharge (WW)
- Barriers to streamflow and tidal flushing (SF)
- Climate change (CC)
- Spread of invasive species (IS)

Projects proposed for this year are aligned with the draft CCMP goals as summarized in Table 2. Table 2 includes interim draft goals for MassBays' revised CCMP, pending adoption by the Management Committee, EPA Region 1, and EPA Headquarters. We anticipate that the Management Committee will finalize these second-draft goals in September, 2016.

Descriptions of the proposed projects reference both the draft CCMP Goals (see Table 2) and the Clean Water Act Core Programs, which are:

- (1) establishing water quality standards
- (2) identifying polluted waters and developing plans to restore them (total maximum daily loads)
- (3) permitting discharges of pollutants from point sources (National Pollutant Discharge Elimination System permits)
- (4) addressing diffuse, nonpoint sources of pollution
- (5) protecting wetlands
- (6) protecting coastal waters through the National Estuary Program
- (7) protecting Large Aquatic Ecosystems.

The following sections provide detailed descriptions of projects by Critical Impact Area, beginning with projects that cut across multiple areas. Each project includes the following:

Title (Status: New or Ongoing)

Objective: project-specific objective

Critical Impact Area: as listed above: SW, WW, SF, CC, and/or IS

Description: Lead entity/staff, project components

Partners: collaborators not directly funded by MassBays/§320 funds

Deliverables and Milestones: products expected, along with the quarter (Q1-Q4) projected for completion

Budget: direct §320 funds (with categories according to Table 3) and non-federal match.

Long-term Outcomes: Project-specific outcomes

CCMP Goal: Per Table 2

CWA core program: Per list (1-7) above

Table 2. CCMP-FFY16 Workplan Alignment

Goal	Outcome	Strategies	Actions (2016-2017)
1. MassBays provides key information about trends and conditions for research and management in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay	<i>A well-informed and connected network of partners, researchers, and managers across MassBays' planning area</i>	<i>make new data available, especially to address specific gaps in knowledge</i>	monitoring and assessment to include: coastal acidification monitoring in Duxbury Bay and Salem Harbor, invasive species monitoring, eelgrass mapping in Salem Sound, horseshoe crab spawning and soft-shell clam population structure analysis on the South Shore, diadromous fish migration, habitat restoration monitoring, salt marsh response to sea level rise
		<i>Analyze and present existing data in multiple formats to document baselines and trends</i>	Products to include: updated Boston Harbor Habitat Atlas, MassBays-wide monitoring framework, Lower North Shore monitoring plan
		<i>Support valid (QA/QC) data collection and application</i>	host citizen monitoring coordinators' summit
2. MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries	<i>Reduced adverse impacts on ecosystem health posed by human activities in MassBays' planning area</i>	<i>Support and conduct research regarding ecosystem functions to inform state policy and local action</i>	Research projects: mussel spat as red knot food source, causes of eelgrass loss in Duxbury-Kingston-Plymouth Bay, the nature of plankton-nutrient-turbidity interdependence in Salem Harbor and Salem Sound, habitat preference of river herring,
		<i>Revise and disseminate existing and new education and outreach materials, providing context and integrating multiple sources as needed</i>	tide gate database introduction, lecture series and symposia
		<i>Provide education, training, and technical support; share case studies (successful and not); and support collaboration and cooperation on specific topics</i>	topics include: stormwater/MS4 permit, LID tech assistance, marine debris/beach water quality monitoring, wastewater management, shellfish restoration, expand shellfishing, increased streamflow and fish passage, resilience of the natural and built environment in response to climate change, living shorelines, habitat restoration support
3. MassBays promotes measurable targets for restoration and protection that reflect unique local conditions and ecosystem capacities	<i>Measurable increases in restored and protected habitat, and improved local environmental conditions across the MassBays planning area</i>	<i>Develop and implement methodology for comparison across embayments</i>	delineation of inter-embayment areas, update data sets, incorporate region-specific data sets and social indicators
		<i>Establish target (improved) conditions for each embayment type</i>	conduct multivariate analysis and literature review to define types and targets for those types
		<i>Guide local action to increase habitat and improve water quality according to targets</i>	

Cross-cutting Projects

Program Evaluation (PE) Reporting and Site Visit (New)

Objective: Meet objectives of PE Guidance, while responding to findings from MassBays' 2012 PE.

Critical Impact Area: All

Description: MassBays is scheduled to provide reporting and host a site visit in early 2017. Reporting will include responses to 2012 PE Findings, including the following documents: 1) finance plan, 2) monitoring plan (described in detail below), 3) communications plan and website enhancements, and 4) revised CCMP (described in detail below). MassBays' Management Committee will establish a subcommittee specifically to prepare for and host the PE site visit.

Partners: MassBays Central Staff leads this effort. Partners include the Management Committee, Regional Coordinators and Local Governance Committees, and EPA Region 1 staff

Deliverables and Milestones:

- Finance Plan to Management Committee for review (Q2)
- Revised CCMP to Management Committee for review (Q2)
- Establish PE Subcommittee (Q2)
- Monitoring Plan to Management Committee for review (Q3)
- Provide pre-reporting to EPA (Q3)
- Host PE site visit (Q4)

Budget: \$30,000 (salaries, fringe, & indirect, \$320 funds)

Long-term Outcomes: Sustained funding under CWA S.320, increased awareness of MassBays resources and potential and real contributions to the larger National Estuary Program

CCMP Goal: All

CWA core program: (6) protecting coastal waters through the National Estuary Program

Comprehensive Conservation and Management Plan (Ongoing)

Objective: Complete the revision of MassBays' CCMP

Critical Impact Area: All

Description: MassBays' Executive Director will work closely with EPA Regional and Headquarters staff to ensure that the CCMP revision meets standards set out by final guidance. Revisions to the Public Review Draft will include:

- Articulating relationship of new CCMP to the 1996 edition
- Providing environmental outcomes-oriented context
- Adding a "financial sustainability" section
- Documenting support for the new CCMP from the Management Committee

Partners: MassBays Central Staff leads this effort. Partners include the Management Committee, Regional Coordinators and their Local Governance Committees, CZM, and EPA Region 1.

Deliverables and Milestones:

The final deliverable will be a Revised CCMP submitted to EPA Headquarters for concurrence, to be provided by December 2016, including the following attachments: draft Fiscal Plan, draft Communications Plan, and draft Monitoring Plan.

Budget: \$30,000 (salaries & fringe, indirect costs, \$320 funds)

Long-term Outcomes: Clear direction for MassBays for the next 10 years; established niche for MassBays in the crowded Massachusetts political/organizational structure around coastal issues and initiatives.

CWA core program: (6) protecting coastal waters through the National Estuary Program

Support Citizen Monitoring in Massachusetts Bay and Cape Cod Bay (ongoing)

Objective: Assess the state of citizen monitoring within the region

Critical Impact Area: All

Description: Multiple organizations across the Bays are conducting monitoring of local resources, but the results and data are, in many cases, hidden away in filing cabinets. In FFY2015, MassBays inventoried ongoing long-term monitoring, university-based data sets, and emerging efforts to document environmental conditions across the region. In FFY 2016, MassBays will convene a Citizen Science Coordinators' Summit to identify specific needs for capacity-building, and develop a plan for meeting those needs.

Partners: Summer intern, NERACOOS, RSPs, Management Committee, watershed and community-based associations, research/academic institutions, state/municipal entities, schools/clubs

Deliverables and Milestones: Summit agenda (Q1), results and action plan (Q2)

Budget: \$320 funds: \$10,000 (salaries, fringe, & indirect), \$500 (travel, meeting supplies)

Long-Term Outcomes: New structure and supports for citizen monitoring efforts, increase in valid data applicable to resource management questions.

CCMP Goal: MassBays provides key information about trends and conditions for research and management in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay.

CWA core program: (6) protecting coastal waters through the National Estuary Program

Embayment assessment and restoration tool (Ongoing)

Objective: to develop a basis for setting restoration targets across the region.

Critical Impact Area: All

Description: MassBays will finalize an extensive revision and update of the Estuary Delineation and Assessment (EDA) to refine embayment characterization and develop an approach to include inter-embayment areas that also play an essential role in the health of the Bays. Building on the EDA, MassBays will identify parameters for cross-region comparison of embayments, and develop a tool for setting restoration targets that represent significant improvement in local conditions. The tool and its implications will be shared with local stakeholders, including municipal decisionmakers, as well as state agencies with responsibility for restoration.

Partners: RCs, LGCs, Management Committee Science & Technology Subcommittee, state and local agency representatives, EPA, GOMC, consultant

Deliverables and Milestones: Updated EDA (Q2); Matrix of embayment types (Q2), target restoration conditions by type (Q3), presentations to state agencies and local stakeholders.

Budget: \$320 funds: \$9000 (salaries & fringe), \$21,000 (consultant)

Long-term Outcomes: measurable improvement in individual embayments' condition.

CCMP Outcomes: MassBays provides key information about trends and conditions for research and management in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay; MassBays reaches all planning-area municipalities with actionable information about estuaries; MassBays promotes measurable targets for restoration and protection that reflect unique local conditions and ecosystem capacities.

CWA core program: (6) protecting coastal waters through the National Estuary Program

MassBays-wide monitoring plan development (Ongoing)

Objective: Meet requirements of the 2012 MassBays Program Evaluation; provide consistent reporting regarding the state of the bays.

Critical Impact Areas: All

Description: MassBays will develop a bays-wide monitoring plan framework that integrates ongoing monitoring efforts and makes use of data to inform on trends and conditions in the MassBays planning area through a State of the Bays reporting system. This project will be guided by the Science and Technical Advisory Subcommittee and based on input from appropriate experts in the field. The project will be informed by the needs of the region as identified by the RCs. MassBays will continue to collaborate with the Northeast Sentinel Monitoring Program and will continue to assist in the process to implement the Science and Implementation Plan released in June 2016. Additionally MassBays will continue to be an active partner in the regional effort to engage stakeholders in ocean acidification awareness through the Northeast Coastal and Ocean Acidification Network and other programs as opportunity permits.

Concurrently, MassBays be developing monitoring programs in specific regions:

- *Coastal Observing System (Focus: Coastal Acidification):* MassBays will deploy a coastal observation system to monitor coastal acidification in Duxbury Bay (South Shore) as part of a growing network of such systems, and similar to the system implemented by Casco Bay NEP. With funding received from EPA and local support coordinated by the South Shore RC, MassBays will collect real-time data on pH and pCO₂ as well as other water column parameters. MassBays staff scientist will coordinate with the RCs to explore similar opportunities in other regions within its planning area, the next one being Salem Sound (Lower North Shore).
- *Lower North Shore 3-year monitoring plan:* MassBays staff scientist will assist the Lower North Shore RC in identifying data gaps, determining monitoring parameters, and developing a 3-year monitoring plan for the region. The Monitoring Plan will be in line with the MassBays-wide monitoring plan framework. This approach may later be applied to the other regions as applicable to ensure that the MassBays Monitoring Plan goals are met.

Deliverables and Milestones: MassBays monitoring plan framework drafted for review by advisors (Q2) and finalized (Q3); MassBays coastal observing system in place and in operation (March 2017); 3-year monitoring plan for MassBays and Lower North Shore with associated cost estimates and funding plans (Q4).

Budget: \$20,000 (salaries, fringe, & indirect, \$320 funds) (RSP budget below)

Long-term Outcomes: More-frequent, long-term monitoring in MassBays, in the larger national and regional context.

CCMP Goals: MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries; MassBays promotes measurable targets for restoration and protection that reflect unique local conditions and ecosystem capacities.
CWA core program: (2) identifying polluted waters and developing plans to restore them

Tide gate management outreach (New)

Objective: Improve salt marsh and tidal wetland conditions upstream and downstream of poorly managed, mismanaged, and abandoned tide gates.

Critical Impact Areas: barriers to streamflow and tidal flushing, climate change

Description: With the completion of an online georeferenced database of all tide gates in our planning area (TideGateway) funded by NOAA, MassBays will engage CZM and municipal staff to promote management of the infrastructure in a way that protects and improves salt marsh and other estuarine habitats.

Partners: MassBays and CZM; RSPs; Advisory group including representatives from DER, DEP, NOAA, USGS, and EPA Region 1.

Deliverables and Milestones: training and outreach for municipal engineers and other tide gate managers, users' guide to TideGateway, the online database (Q4)

Total budget: \$4000 (salaries, fringe, & indirect \$320 funds)

Long-term Outcomes: Increase in active, informed tide gate management that takes into account surrounding natural resources, abutting development, and rising sea levels.

CCMP Goals: MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries.

CWA core program: (5) protecting wetlands

Target species and habitat monitoring and assessment (New and Ongoing)

Objective: support long-term monitoring of critical species and habitats in MassBays

Critical Impact Areas: All

Description: All RCs will take up sub-region-specific monitoring and assessment efforts to support CCMP goals and outcomes. Programs include:

- Metro Boston RC will update the Boston Harbor Habitat Atlas and associated resources, including migrating to a new online platform. (Ongoing)
- Metro Boston RC will partner with the Boston National Parks to plan and host a Boston Harbor Science Symposium to facilitate regional information exchange (New)
- Lower North Shore RC will assist mapping to assess eelgrass trends in Salem Sound from 1951 to present, using historical aerial photographs at a finer scale and use a consistent methodology over all time periods and start to elucidate potential causative factors for eelgrass losses noted in recent years. (New)
- Lower North Shore RC will initiate efforts to elucidate the nature of plankton-nutrient-turbidity interdependence in Salem Harbor and the larger estuary. (New)
- South Shore RC will collaborate with DMF to assess potential causes of eelgrass loss documented through FFY2015 mapping efforts, convening experts to discuss course(s) of action. (New)
- South Shore RC will conduct horseshoe crab spawning surveys in Duxbury Bay in May and June and assist with tagging and re-sighting horseshoe crabs. (Ongoing)

- South Shore RC will investigate potential for restoring mussel habitat, including a joint project with Mass Audubon South Shore to assess the role of mussel spat as a food source for migratory red knots (Ongoing) and investigate soft-shell clam population structure in the Gulf River. (New)
- South Shore and Cape Cod RC will continue river herring monitoring (Ongoing) and collaborate with DMF to assess trends in run sizes between 2007 and 2016 for reporting to the EPA Program Evaluation Team. (New)
- Cape Cod RC will continue to help build capacity of the Cape Cod Restoration Coordination Center (Ongoing) and utilize studies (salt marsh monitoring data, USGS sea level rise-aquifer study, APCC salt marsh migration study, CCS sediment budget studies, others) to assess restoration success and identify new restoration opportunities. (New)

Partners: municipal staff, DMF, CZM, MassAudubon, CCS, UNH, EPA Region 1

Deliverables and Milestones: three Boston Harbor habitat available online via an interactive Atlas (Q4), eelgrass maps for Salem Sound (Q4), design for plankton-nutrient-turbidity study (Q4) number of volunteers engaged in horseshoe crab spawning surveys (Q4), map and summary of mussel project (Q3), North and South Rivers mussel bed status report (Q1) Gulf River shellfish survey report (Q2), summary of leading causes for eelgrass loss in the bays based on current information (Q3), 2016 season herring data submitted to DMF (Q2), herring run trends report for Cape Cod and South Shore (Q3), assessment of restoration success and restoration opportunities for Cape Cod (Q4).

Budget: RSP grants (see below, \$320 funds)

Long-term Outcomes: Improved habitat value and species conditions

CCMP Goal: MassBays provides key information about trends and conditions for research and management in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay.

CWA core program: (6) protecting coastal waters through the National Estuary Program

Communications and Outreach Planning and Implementation

Objective: respond to Program Evaluation, increase awareness of MassBays natural, educational, and information resources.

Description: While MassBays Central Staff develops a region-wide Communications Plan for MassBays, RCs will provide the following opportunities for local citizens to hear about the importance of natural resource protection and restoration:

- Underwater in Salem Sound Lecture Series (Lower North Shore)
- Great Marsh Sea Level Rise Adaptation Workshop (Upper North Shore)
- High School Marine Science Symposium (Metro Boston)
- NUMSC Film and Lecture Series (Metro Boston)
- Watershed Stewardship Certificate Program presentations (South Shore)

Partners: local nonprofits, municipal officials and staff, researchers, regional planners

Deliverables and Milestones: This effort will be ongoing throughout the year; deliverables will include reports from individual and group meetings, lecture program listings, conference agendas, printed and online materials.

Budget: \$5000 Communications consulting, RSP grants (\$320 funds)

Long-term Outcomes: Informed local response to climate change impacts

CCMP Outcomes: MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries.

CWA core program: (6) protecting coastal waters through the National Estuary Program

Critical Impact Area Projects

The projects below will be funded with up to \$61,000 per region, primarily for salaries.

Contaminated and uncontrolled stormwater runoff (SW)

1. Stormwater management technical support, education, and outreach (New and Ongoing)

Objective: Provide technical support and outreach materials and services to municipalities to improve stormwater quality and reduce quantity.

Description: All RCs will promote stormwater best management practices, especially green infrastructure alternatives. Specific efforts include facilitating the following:

- *Cape Cod Stormwater Managers Group*, especially to identify needs, explore formation of a Cape Cod Stormwater Collaborative, provide outreach, obtain resources for stormwater managers and publicize successes. (Ongoing)
- *South Shore Stormwater Coalition* will provide outreach to fire and planning departments on the South Shore about road design to reduce stormwater. The South Shore RC will initiate work with MAPC and MassDOT to assess and prioritize stormwater improvements along Route 3 to protect and improve the North, South, Eel, and Jones Rivers, as well as Town Brook. (New)
- Community-based *Greenscapes* program to conduct public education to increase awareness of the importance of reducing stormwater through adequate funding, infiltration, and environmentally friendly landscaping. (North and South Shores, Ongoing)
- *Merrimack Valley Stormwater Collaborative* will provide technical assistance to Collaborative communities regarding MS4 stormwater management compliance and best management practices. (Upper North Shore, Ongoing)
- All RCs will identify and take advantage of opportunities to promote and implement LID in local communities, for example the Upper North Shore RC will work with *Ask This Old House* to document and promote landscaping that protects salt marshes. (New and Ongoing)

Partners: Municipal staff and elected officials, local nonprofits and municipal boards and commissions, regional planning agencies, MA DOT, private contractors

Deliverables and Milestones: Kick-off meeting for the South Shore MS4 Coalition (Q2), Mission statement, documentation of support to the Cape Cod Stormwater Collaborative (Q3), materials developed for distribution to Greenscapes communities (Q4), documented municipal investment (membership dues) in Greenscapes (Q1), education and outreach products regarding stormwater and LID that can be used across MassBays and by other NEPs (Q3), list of LID education outreach and grant assistance (Q4), implementation of at least one LID demonstration site in the Lower North Shore (Q4)

Long-term Outcomes: Stormwater management helps to improve water quality that supports healthy coastal ecosystems and sustainable human uses.

CCMP Goal: MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries.

CWA core program: (4) addressing diffuse, nonpoint sources of pollution

2. *Adopt a Beach Program (Ongoing)*

Objective: To restore shoreline habitats

Description: Lower North Shore RC will train volunteer “beachkeepers” to remove marine debris and monitor their adopted area for resource degradation. Adopted areas include beaches, islands and river banks.

Partners: 480 trained beachkeepers, local DPWs and Parks & Recreation Departments, SWIM

Deliverables and Milestones: List of training sessions and clean up events, map of beaches, islands and river bank adopted. (Q4)

Long-term Outcomes: Increased stewardship of natural resources including public awareness of the impacts of human behaviors on shoreline habitats, such as stormwater, marine debris, and invasive species.

CCMP Goal: MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries

CWA core program: (4) addressing diffuse, nonpoint source s of pollution

3. *Temporal and spatial expansion of open shellfish beds (Ongoing)*

Objective: To increase the acreage and duration of open shellfish beds

Description: South Shore and Cape Cod RCs will work with partner communities to pursue stormwater and wastewater improvements in locations that impact shellfish beds, and with DMF to generate an approved priority list for sub-regional shellfish beds. Actionable information to guide restoration will be provided to municipalities, MassBays and agencies.

Partners: South Shore and Cape Cod towns, DMF, CRC, CCC, DER, NRCS

Deliverables and Milestones:

- Grant application(s) for stormwater improvement efforts aligned with DMF-approved priority list for South Shore shellfish beds (Q3)
- List of Cape Cod-based projects, criteria for projects, rankings, lessons learned, recommendations, meeting notes, outreach materials. (Q3).

Long-term Outcomes: Increased acreage and duration of open shellfish beds on the South Shore and Cape Cod

CCMP Goals: MassBays provides key information about trends and conditions for research and management in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay; MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries

CWA core program: (4) addressing diffuse, nonpoint sources of pollution

Wastewater discharge (WW)

1. *Promote science-based wastewater management on Cape Cod (Ongoing)*

Objective: The Cape Cod RC will continue to work with partners to promote regional science-based wastewater management that effectively improves water quality and habitats, by: a) Continuing to serve on and provide input to the Cape Cod Commission’s 208 Water Quality Plan Monitoring Subcommittee that provides recommendations for monitoring wastewater management options; b) Providing coordination, outreach or other technical assistance to

communities to help them address coastal water quality issues related to wastewater or stormwater; and c) Continuing to promote information-sharing between towns and the County regarding wastewater, stormwater and water quality management through support of CRC activities. (Ongoing)

Partners: CCC, 35 Cape Cod-based nonprofits, CRC, EPA Region 1

Deliverables and Milestones: Outreach materials, meeting notes, draft and final recommendations for monitoring, technical input to 208 Monitoring Subcommittee, or other deliverables to be determined. (Q1-Q4)

Long-term Outcomes: Improved near-shore water quality

CCMP Goal: MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries

CWA core program: (6) protecting coastal waters through the National Estuary Program

2. *Clean Beaches & Streams Program (New and Ongoing)*

Objective: To reduce bacterial contamination in Category 4 and 5 303d-listed waters

Description: Lower North Shore RC will identify bacterial pollution with biweekly summer water testing for Enterococcus at outfalls and streams throughout the Lower North Shore and notify the appropriate authorities of the results. The towns of Danvers and Peabody will be the focus of testing using the EPA Stormwater Equipment Toolbox.

Partners: Clean Beaches & Streams Network, volunteers

Deliverables and Milestones: Bacterial levels for 14 - 22 outfalls or streams and results from stream assessments published on SSCW website (Q1) b) Results from stream assessments (Q2) c) Case study of one remediation effort by a municipality (Q4)

Long-term Outcomes: Improved conditions to support habitat restoration

CCMP Goals: MassBays provides key information about trends and conditions for research and management in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay; MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries

CWA core program: addressing diffuse, nonpoint sources of pollution

Barriers to streamflow and tidal flushing (TF)

1. *Publish salt marsh monitoring data for flow-restored marshes (New)*

Objective: Make salt marsh monitoring data accessible

Description: Between 2003 and 2014 APCC monitored more than 15 Cape Cod salt marshes to compare pre-restoration and post-restoration conditions. Reports were provided to state agencies but are not readily accessible otherwise. This information will be made available to resource managers, particularly as climate change and sea level rise may affect coastal wetlands. A summary report, modeled on similar reporting by DER for other locations, would also help to build public support for protecting and restoring salt marshes. The Cape Cod RC will develop a short outreach report summarizing salt marsh monitoring data.

Partner: DER

Deliverables and Milestones: Draft report describing preliminary results (Q3), final synthesis report (Q4 or following)

Long-term Outcomes: Better-informed restoration projects

CCMP Outcomes: MassBays provides key information about trends and conditions for research and management in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay; MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries.

CWA core program: (5) protecting wetlands

2. *Streamflow and habitat restoration (New and Ongoing)*

Objective: support municipalities in their efforts to restore habitat and maintain appropriate streamflow in the midst of competing demands

Description: South Shore RC will work with the Towns of Scituate (First Herring Brook) and Norwell and Hanover (Third Herring Brook) to maintain ecologically appropriate flows within the context of municipal water demand and implement the results of the towns' previous state-funded sustainable water management initiative grants. On Cape Cod, the RC will continue to help build capacity of the new Cape Cod Restoration Coordination Center (RCC) and will assist towns, restoration agencies and organizations with project development, project management, monitoring, grant-writing, outreach or other services needed to implement restoration projects.

Partners: Towns of Scituate, Norwell, Hanover, and Cape Cod municipalities, DER, DEP, CRC, CCC, DER, CCCD, NRCS, DMF

Deliverables and Milestones: Outreach materials regarding South Shore municipal water use patterns (Q3), reporting on South Shore municipal action taken to improve streamflow (Q4), list of Cape Cod projects advanced via the RCC through grantwriting or technical assistance (Q4).

Long-term Outcomes: Improved and restored in-stream and estuarine habitat

CCMP Goals: MassBays provides key information about trends and conditions for research and management in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay; MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries.

CWA core program: (6) protecting coastal waters through the National Estuary Program

3. *Dam removals and stream continuity (Ongoing)*

Objective: improve stream continuity and fish passage

Description: South Shore RC will work with multiple communities and partners to assess feasibility of and seek funding for removal of dams and other barriers and collect ecological data pre- and post-restoration. Projects will include Mill Pond Dam (post-restoration) and Tack Factory Dam (pre- and post-restoration) on Third Herring Brook (Norwell/Hanover), multiple structures on the South River (Marshfield/Duxbury, pre-restoration), Hunters Pond Dam on Bound Brook (Scituate/Cohasset, pre-restoration), Elm Street Dam (pre-restoration) on the Jones River (Kingston), and multiple structures on Town Brook (Plymouth, pre- and post-restoration),.

Partners: Towns of Norwell, Hanover, Marshfield, Duxbury, Scituate, Cohasset, and Plymouth; DER; DMF; NOAA

Deliverables and Milestones: At least one grant proposal to advance dam removal at any of the proposed sites (Q4), summary report on dam removal efforts and progress (Q4)

Long-term Outcomes: Increased access to stream-miles for fish and other wildlife

CCMP Goal: MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries.

CWA core program: (6) protecting coastal waters through the National Estuary Program

4. *Diadromous fish research and assessment (New and Ongoing)*

Objective: improve understanding of diadromous fish habitat use, and assess existing monitoring protocols.

Description: South Shore and Cape Cod RCs will continue to participate in the Herring Warden Network to improve and implement best management practices relevant to conducting herring counts and managing fish ladders. (Ongoing) The South Shore RC will provide field assistance to MIT Sea Grant in their MassBays-funded effort to characterize herring utilization and preferences among habitats in the newly restored Tidmarsh Farms. Pending funding, the South Shore RC will participate in an effort to tag river herring and eastern brook trout in Third Herring Brook with transponders. (New)

Partners: DMF, municipal staff, River Herring Warden Network, NMFS, MIT Sea Grant, local nonprofits, citizen-volunteers

Deliverables and Milestones: Reporting and outreach materials regarding best practices for herring monitoring, (Q3) and photo documentation of tagging efforts. (Q3)

Long-term Outcomes: Well-informed resource management decisions

CCMP Goals: MassBays provides key information about trends and conditions for research and management in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay; MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries.

CWA core program: (6) protecting coastal waters through the National Estuary Program

Climate Change (CC)

1. *Climate Change Resilience in the Great Marsh (Ongoing)*

Objective: Ensure on-time and on-budget deliverables under a Hurricane Sandy NFWF grant

Description: With support from the Upper North Shore RC, the Great Marsh Resiliency Team received \$2.9M NFWF funding to implement a suite of projects that should simultaneously reduce risk to coastal communities while increasing the resiliency of those ecological systems that those communities are dependent upon. The RC will manage several components of this project, including the Native Marsh Vegetation Restoration Component (*Phragmites* and pepperweed Control), Eelgrass Restoration, Student Conservation Association Researchers, and contractors responsible for hydrodynamic modeling data collection and modeling (including chairing the Model Oversight Committee).

Partners: NWF, Parker River NWR, BU, MassAudubon, IRWA, Woods Hole Group, UNH/Jackson Laboratory, MBL, CCS, Great Marsh communities

Deliverables and Milestones: interim program reports for the individual projects (as submitted to NFWF) (Q2, Q4), report on preliminary results of hydrologic modeling for salinity, presented as part of MassBays' Program Evaluation. (Q3)

Long-term Outcomes: Reduced risk from climate change impacts to coastal communities and increased resiliency of ecological systems

CCMP Goal: MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries.

CWA core program: (6) protecting wetlands

2. *Evaluation of nature-based solutions for SLR mitigation in Massachusetts marshes (New, pending grant funding)*

Objective: to secure funding and determine if nature-based solutions are feasible and permissible in the Great Marsh and elsewhere in Massachusetts.

Description: The Town of Essex is considering increasing the elevation and/or/restoring degrading coastal marsh protecting their critical SLR vulnerable infrastructure. The impact of these practices in Essex Bay and Massachusetts marshes is not well understood. The Upper North Shore RC will manage a project to conduct research on alternative approaches to improve marsh resiliency regarding their applicability in Massachusetts and likelihood of acceptance by communities and regulators.

Partners: CZM, DEP, ACOE, BU, UNH, NWF, USFWS

Deliverables: Literature review (Q1), field data assessment (marsh integrity-core biological and physical marsh health metrics) and stakeholder/regulator meetings (Q2, Q3), site evaluations (Q3), and final report on findings and recommendations (Q4).

Long-term Outcomes: Adoption of environmentally sound responses to climate change impacts on coastal marshes

CCMP Goal: MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries.

CWA core program: (6) protecting wetlands

3. *Impacts of sea level rise on water resources and infrastructure: recommendations and support for adaptation (Ongoing)*

Objective: Document, present, and support action on adaptive responses to potential effects of rising sea level on the mid-Cape's groundwater system and Cape-wide climate change impacts

Description: Cape Cod RC will work with the USGS and partners to communicate the results of a study of SLR impact on groundwater into public outreach materials, policies and adaptation measures. Adaptation measures will likely address effects of rising groundwater on stream baseflow, depth to groundwater, and changes in the subsurface saltwater-freshwater interface, which could impact infrastructure, wastewater management, water, wetlands, ecosystems, planning, and land use.

Partners: USGS, CCC, TNC, CRC.

Deliverables and Milestones: Literature review of adaptation measures and recommendations for adaptation measures (Q2), at least one public presentation (Q4).

Long-term Outcomes: Municipal and Cape-wide plans to respond to sea level rise

CCMP Goal: MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries.

CWA core program: (6) protecting coastal waters through the National Estuary Program

4. *Marsh response to sea level rise (New and Ongoing)*

Objective: To document current conditions and monitor changes in salt marsh characteristics

Description: MassBays RCs will take up the following initiatives:

- The Upper North Shore RC will help the town of Newbury measure sediment accretion rates in local fronting marshes, to support prioritization of responses that will protect natural resources and engineered structures. (New)
- The Upper North Shore RC will support the Marsh Edge Erosion Task Force initiative to collect data and identify priority stressors, including wave action, bioturbators, SLR, and excessive nutrients, at sites in Plum Island Sound, Essex Bay, and Salem Sound. (Ongoing)
- The Lower North Shore RC will monitor salt marshes at Good Harbor Marsh (Gloucester), Juniper Cove (Salem) and Old Creek Marsh (SSU Salem) and Thissel Marsh (Endicott College) using citizen science protocols to monitor long-term climate change impacts on salt marshes from SLR. (Ongoing)
- The South Shore RC will establish and conduct long-term monitoring of vegetation change, including conversion of high marsh to low marsh and brackish marsh to salt marsh, to document the impact of sea level rise at sites selected in consultation with CZM. (Ongoing and New)

Partners: BU, Parker River NWR, MBL, PIE-LTER, Cape Cod National Seashore, SSCW, DER, CZM, DMF, Friends of Good Harbor, UNH, SSU, Endicott College, and the Towns of Newbury, Scituate, Marshfield, Norwell, Hanover, and Pembroke

Deliverables: sediment accretion data collection and analysis (Q1-3) and draft report (Q4); marsh edge erosion seasonal measurements (Q1, Q3), GIS mapping of Plum Island Sound and Essex Bay banks and erosion (Q4), report on suspected primary causes of marsh edge erosion (Q4); maps and preliminary survey of vegetation types on the North River (Q3); report of findings and photos of monitoring efforts in Gloucester, Salem, and Haverhill (Q2)

Long-term outcomes: Healthy and resilient coastal marshes

CCMP Goals: MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries.

CWA core program: (5) protecting wetlands

5. *Municipal Coastal Resiliency/Living Shorelines (New)*

Objective: Assist municipalities in implementing coastal resiliency and living shoreline initiatives

Description: RCs will contribute to multiple efforts across the MassBays planning area, including:

- The Upper North Shore RC will continue efforts to establish and expand eelgrass beds in Essex Bay (Ongoing) and Plum Island Sound. (New)
- Lower North Shore RC will work with the City of Salem to plan and implement green infrastructure - living shorelines projects identified over the past year's joint efforts. (Ongoing)
- Lower North Shore RC will serve on the Manchester Coastal Resiliency Advisory Group, providing technical assistance, data collection and outreach support. Additional municipalities will be invited to establish similar groups. (New and Ongoing)
- Metro Boston RC will assist Braintree in their state-funded coastal resiliency effort. (New)
- The Cape Cod RC will provide outreach, technical assistance, grant-writing, assist CCC to develop a matrix of coastal adaptation measures as part of the Commission's NOAA-funded project to build the Cape's coastal resilience. (Ongoing)
- Cape Cod RC will continue to assist CRC to develop recommendations for County Commissioners for improving coastal resiliency. (Ongoing)
- Cape Cod RC will work with a newly formed Cape Cod Climate Change Collaborative to

promote adaptation. (New)

Partners: CZM; Braintree, Salem, Manchester-by-the-Sea, and Beverly staff and residents; Tighe & Bond; Barnstable County CRC members, NWF, BU, the Eight Towns and the Great Marsh Committee, SCA, and area volunteers.

Deliverables and Milestones: 1.5 acres of eelgrass planted (Q1-2), eelgrass restoration report (Q4), grant applications; recommendations, outreach products (Q4), written and presented case studies on lessons learned (Q4)

Long-term Outcomes: Local stakeholders will be engaged in efforts to expand living shorelines for habitat protection and storm/sea level rise impact mitigation.

CCMP Goal: MassBays provides technical assistance and action-oriented communications about the roles, functions, and values of healthy estuaries.

CWA core program: (6) protecting coastal waters through the National Estuary Program

Spread of Invasive Species (IS)

1. Invasive species mapping, treatment, and control

Objective: To control emergent and existing *Phragmites* stands, control invasive pepperweed and purple loosestrife, and devise controls for green crabs

Description: Several of the RCs will continue efforts to control and eradicate invasive species that reduce ecosystem value of habitats:

- Upper North Shore RC will conduct ongoing efforts to monitor and control *Phragmites*, first assessing previously treated areas prior to seasonal treatment to determine the effectiveness of 2015 treatments and to provide an estimate for the treatment contractor for bid purposes. The RC will continue to seek treatment permissions from owners of property previously identified to contain *Phragmites* stands, and hire contractors to treat invasive *Phragmites* throughout the marsh. (Ongoing)
- Lower North Shore RC will lead pepperweed education and removal efforts to limit its spread as part of a New England-wide community-based mapping and control effort. Upper North Shore RC will also continue the in-the-field monitoring of pepperweed in estuarine areas that have not yet been evaluated and complete finer mapping of non-accessed, known sites. Activities will also consist of pepperweed pulling and chemical treatment. (Ongoing)
- Upper North and South Shore RCs will participate in a New England-wide effort to document green crab extent in Massachusetts, using standard protocols. (New and Ongoing) Upper North Shore RC will develop a management plan to reduce the impacts of crab population may include a human consumption marketing strategy to sustainably reduce populations level into the future. (New)
- South Shore RC will work with partners to map and potentially manage *Phragmites* in the North River corridor, as well as share experience and expertise with managing purple loosestrife using *Galerucella* beetle ranching with resource managers and conservation organizations. (New)

Partners: BU, MassAudubon, Parker River NWR, MA-NH-ME Invasives Group, property owners, municipalities, WAA, USFWS, local nonprofits, NE Mosquito Control District, SCA, Great Marsh Revitalization Task Force, DMF

Deliverables and Milestones: Map of *Phragmites* remaining on the high marsh platform in the Great Marsh (Q4), report on contractors' treatment activities and results (Q2), documentation of volunteer efforts (Q3), maps of treated sites in all regions (Q4), reports on green crab-related monitoring efforts (Q2), draft green crab management/marketing plan (Q4).

Long-term Outcomes: Improved habitat value

CCMP Goals: MassBays provides key information about trends and conditions for research and management in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay; MassBays promotes measurable targets for restoration and protection that reflect unique local conditions and ecosystem capacities.

CWA core program: (6) protecting coastal waters through the National Estuary Program

2. *Marine Invasive Species Monitoring (Ongoing)*

Objective: maintain state-wide database (MIMIC) of introduced species

Description: Working with citizen monitoring groups, Lower North Shore and South Shore RCs will monitor multiple established field sites for non-native species. Data are provided to CZM program for inclusion in online coastal maps.

Partners: CZM, MIT Sea Grant, Gulf of Maine Research Institute, Mass Audubon, Eight Towns and the Great Marsh volunteers

Deliverables and Milestones: Photo documentation of monitoring (Q2); data submitted to CZM MIMIC coordinator (Q2)

Long-term Outcomes: Increased understanding of the transport, population dynamics, and impacts of invasive species, early detection of newly arriving invasive species.

CCMP Goal: MassBays provides key information about trends and conditions for research and management in Ipswich Bay, Massachusetts Bay, and Cape Cod Bay.

CWA core program: (6) protecting coastal waters through the National Estuary Program